Jack Lifton on the Economic Realities of Building a U.S. Rare Earth Supply Chain with Lessons from Lynas

written by Jack Lifton | January 25, 2025

In order for the United States to foster a domestic rare earth permanent magnet industry, financiers behind prospective companies must focus on mitigating or eliminating financial risk. A common approach to achieving this is by socializing losses, essentially shifting the financial burden onto taxpayers. This practice can sometimes involve complicity from entities like the U.S. Department of Defense, which might obfuscate agreed prices for domestically produced rare earth permanent magnets, effectively covering up the financial realities.

When considering a supplier, a well-managed Original Equipment Manufacturer (OEM) conducts thorough due diligence on the supplier's financial viability. The critical question is whether the supplier can deliver the product on time, to specification, in the agreed quantity, and at the agreed price, without requiring a financial bailout. Historically, OEMs have avoided direct purchases from non-producing junior miners, preferring suppliers who already produce at scale.

Globally, there are only a few non-Chinese miners producing significant volumes of rare earths. Lynas Corp of Australia, with its Mount Weld mine, is a seasoned producer having been in operation longer than others outside China. Lynas has ventured into downstream processing but has not fully integrated down to the production of rare earth permanent magnets.

Understanding the capital costs and economic viability of establishing a full supply chain for rare earth permanent magnets is complex and requires deep industry knowledge. Public estimates of these costs are often unreliable or non-existent. The lack of rigorous techno-economic due diligence in the non-Chinese world is a notable gap.

The key steps in establishing a rare earth supply chain include:

1. Mining and production of rare earth-bearing minerals.
2. Separation of rare earths into individual or combined products.
3. Conversion into necessary chemical forms for producing metals and alloys.
4. Manufacturing of specific rare earth alloys and metals.
5. Processing these materials into forms required for making rare earth permanent magnets.

The example of Lynas is particularly instructive in understanding the challenges faced by rare earth processing companies. Initially, Lynas (ASX: LYC) processed its high-grade ore from Mount Weld at its Lynas Advanced Materials Plant (LAMP) in Kuantan, Malaysia. This location was chosen due to its existing chemical industry infrastructure and lower operational costs compared to Australia. The facility was designed to integrate ore processing (cracking and leaching) operations alongside rare earth separation and was built adjacent to a BASF-owned chemical plant.

However, Lynas faced significant environmental and regulatory challenges in Malaysia, particularly concerning the management of radioactive waste byproducts like thorium. The Malaysian government’s stringent environmental laws required that the LAMP retrofit its operations to eliminate the extraction and storage

of radioactive materials within Malaysia. This regulation prompted Lynas to shift its extraction operations back to Australia, a move that involved substantial logistical challenges and financial overruns, reportedly costing up to one billion Australian dollars.

These challenges highlight the complexities and substantial costs involved in setting up and operating a rare earth supply chain. Such ventures are not merely about mining and processing but also about navigating economic, political, and environmental landscapes.

Ultimately, building a complete domestic rare earth permanent magnet supply chain in the U.S. is not just about securing a supply chain independent of Chinese dominance. It’s about ensuring that such a chain is economically viable and does not rely on market distortions like socialized losses. The U.S. needs to develop in-house expertise, economic acuity, and market awareness to support such a venture effectively. This is not about replicating the past but about innovating a sustainable and profitable future in the rare earth industry.